

# PATENT SPECIFICATION

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## (54) MAGNETIC TAPE HAVING OPTICALLY PERCEPTIBLE MARKERS AND METHOD OF MANUFACTURING SUCH A TAPE

(71) We, N.V. PHILIPS' GLOEILAMPENFABRIEKEN, a limited liability Company, organised and established under the laws of the Kingdom of the Netherlands, of Emmasingel 29, Eindhoven, the Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a magnetic tape comprising a transparent plastics material support and a magnetisable coating thereon having markers arranged in the tape so that they are optically perceptible from the uncoated side of the support.

German Patent Specification 814,948 discloses a magnetic tape in which, during the manufacturing operation, markers are provided on that side of the support on which the magnetisable coating is to be deposited in a subsequent manufacturing stage (the coating side). The markers may be a series arranged in the form of a stroboscopic distribution. Since the support is a transparent or translucent material, these markers can be perceived optically from the uncoated side of the support. The markers in question may be provided on the coating side of the support *via* a printing process or photographically. A disadvantage hereof is that the adhesion of the magnetisable coating to the support surface may be reduced, while a user of such a magnetic tape can no longer provide said tape with markers which are suitable for his specific purpose because this has already been done during the manufacture of the tape. Although in the aforementioned Specification the possibility is also suggested of preparing the support with a photo-sensitive substance, for example a diazo compound, so that a user himself can provide markers *via* exposure to light, a disadvantage of this is that only such specially prepared tapes

and not just an ordinary magnetic tape can be used.

It is an object of the invention to provide a magnetic tape having markers which are optically perceptible from the uncoated side of the support, in which the support does not have to be specially prepared in advance of the marking operation.

According to the invention, there is provided a magnetic tape comprising a transparent plastics material support and a magnetisable coating thereon having markers arranged in the tape so that they are optically perceptible from the uncoated side of the support, in which the markers comprise milky areas embedded in the plastics material of the support which scatter light incident from the uncoated side of the support more strongly than their surroundings.

Within the scope of the invention, such areas may be provided by locally irradiating the magnetic tape with light from a laser source on the uncoated side of the support. The light of the laser passes through the support but not through the magnetisable coating. As a result of this a local heating of the support produces a variation in the behaviour of the irradiated area with respect to light, and milky bubbles become visible at the interface between the magnetisable coating and the support surface. This effect occurs particularly clearly when the magnetisable coating comprises chromium dioxide.

In this connection it is to be noted that before any magnetisable coating has been deposited on the support, the radiation of a laser passes through it without producing any significant heating effect. Milky bubbles are formed only when the support has a magnetisable coating which does not pass the radiation. The physical properties of the magnetisable coating itself are not influenced by the radiation of the laser.

The invention also relates to a method of

manufacturing a magnetic tape having optically perceptible markers. The method according to the invention comprises directing a laser beam at the uncoated side of an optionally moving tape to convert selected areas of the plastics material support of the tape from a transparent state into a milky state.

By controlling the laser beam, markers in the form of dots, strips or alphanumeric characters may be formed as a result of which the use of a magnetic tape having such markers may be of advantage in a variety of fields. These fields include: synchronisation markers intended for the control of the tape speed (German Patent Specification 806,059), indices for finding selected passages (Netherlands Patent Application 250,275), and markers for editing video tapes (Netherlands Patent Application 7112916). Detection of the markers on a magnetic tape of the invention may be done either visually, or via a reading device which is sensitive to variations in the intensity of the light reflected by the magnetisable coating.

An embodiment of the invention will be described in greater detail by way of example, with reference to the accompanying drawing.

The single figure of the drawing shows a device for providing a magnetic tape with optically perceptible markers.

The device depicted comprises a laser source 1 which produces a laser beam 2. The laser source 1 may be, for example, a carbon dioxide laser having a power consumption of a few tens of Watts. The laser beam 2 is focused by a lens 3 on an interface 4 between a transparent plastics material support 5 and a magnetisable coating 6 of a magnetic tape 7.

A pulse shaper 8 shapes the beam 2 into pulses. The beam 2 passes through a beam aiming device 9 which directs the beam 2 at selected areas of the magnetic tape 7. The spot diameter of the laser beam may vary from a few tens to a few hundreds of microns dependent on the application for which the markers are to be used. The magnetic tape 7 is transported by driving means (not shown) from an unwinding reel 10 to a winding reel 11 at a rate of a few metres per second. In the areas where the laser beam 2 impinges upon the support, a milky bubble or a track of milky bubbles (dependent on the pulse width of the laser beam 2) becomes visible at the interface 4 between the support 5 and the magnetisable coating 6 (for which chromium dioxide may be used as a suitable magnetic material).

A typical application possibility of a magnetic tape provided with markers lies, for example, in the field of editing video

recordings of magnetic tape in which the cutting and splicing of the tape is not possible because this does not enable a good picture sequence to be obtained. For this purpose, a first desired scene is recorded on the tape of a first video recorder machine, after which the machine is stopped. A tape comprising the second scene is then reproduced on a second video recorder machine until the beginning of the second scene is reached, after which the second machine is also stopped. When the first machine is switched to recording operation and the two machines are started simultaneously the second machine remaining switched on to play-back operation, the scene which is recorded on the tape of the second machine is transmitted to the tape of the first machine. However, for a good picture sequence it is essential that, after the simultaneous starting, the two machines should have run a certain number of seconds which depends on the type of machine while they synchronise each other before the signal of the tape of the second machine can be recorded on the tape of the first machine with proper sequence. After having stopped the two machines at the end of the first scene and the beginning of the second scene, respectively, the tape on both machines must thus be moved back over a distance which corresponds to the number of seconds in question. Only then can the two machines be started simultaneously after which the first machine is switched to recording at the end of the first scene, at which instant the playback of the second machine just begins with the second scene which is then transmitted to the tape of the first machine. Since at this instant the two machines have synchronized each other during the necessary time, a good picture sequence can be obtained. However, it is particularly difficult to rewind the tape on both machines accurately over the desired distance. If the rewinding length on the two machines is not equal, a good picture sequence can still be obtained but the desired interchange between the two scenes does not occur if a short gap is formed between the two scenes, or the beginning of the second scene is lost. Measuring the required tape length is not easy since the tape cannot be handled and the required rewinding length is substantial since the usual time during which both machines must run in synchronism for the sequence is ten to twenty seconds and the tape speed usually is 17.88 centimetres per second (for tape having a width of 25.4 millimetres) or 29.14 centimetres per second (for tape having a width of 12.7 millimetres). The rewinding length thus is from 178.8 centimetres to 582.8 centimetres which cannot easily be measured. The tape counters with

which magnetic tape recorders are usually equipped are not sufficiently accurate to measure the desired rewinding length. The provision of a separate accurate counter solely for the operation of rewinding during editing also has disadvantages.

The invention now provides the possibility of using a magnetic tape having a visual marker which is continuous along the length of the tape with uniform intermediate spaces and progressive numeration which is perceptible from the rear side of the tape.

In fact this marker is a delay time scale division. When the machines have stopped at the end of the first scene and the beginning of the second scene, respectively, said scale divisions can be read by means of a simple marker on the machine. The two tapes are then rewound, manually or by an auxiliary driving mechanism, until the scale divisions on the two tapes indicate that they have each been rewound accurately over the desired delay time. The two machines may then be started simultaneously and at the end of the first scene the first machine may be switched to recording, after which the second scene is copied from the tape of the second machine to the tape of the first machine.

parent plastics material support and a magnetisable coating thereon having markers arranged in the tape so that they are optically perceptible from the uncoated side of the support, in which the markers comprise milky areas embedded in the plastics material of the support which scatter light incident from the uncoated side of the support more strongly than their surroundings.

2. A magnetic tape as claimed in Claim 1, in which the magnetisable coating comprises chromium dioxide.

3. A method of manufacturing a magnetic tape having optically perceptible markers, comprising directing a laser beam at the uncoated side of an optionally moving tape to convert selected areas of the plastics material support of the tape from a transparent state into a milky state.

4. A method of manufacturing a magnetic tape having optically perceptible markers, substantially as hereinbefore described with reference to the accompanying drawing.

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#### WHAT WE CLAIM IS:—

1. A magnetic tape comprising a trans-

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale*

